

PCT/EP2005/002975

HPJ/kö

20 January 2006

Goldschmidt et al.

Claims:

1. A method to detect directly an effect caused by a population of organisms, comprising the steps of:

- a) determining an enzymatic activity specifically shared by the population of organisms responsible of said effect
- b) selecting a substrate transformable by the shared enzymatic activity determined at step a),
- c) collecting a sample suspected to contain said population of organisms,
- d) contacting said collected sample with the substrate selected at step b),
- e) detecting and optionally quantifying the amount of transformed substrate,

wherein said method is performed in the absence of any culture step.

2. The method according to claim 1, wherein the sample is collected on a surface or in a liquid.

3. The method according to claim 2, wherein the surface is any part of an object, of food, of a plant, of an animal or human body.

4. The method according to the previous claim 3, wherein the part of an animal or human body is skin, hair, nails, eyes, teeth, or mucous membranes.

5. The method according to the claim 2, wherein the liquid is from an environment, from food, from plants, from industrial wastes, from an animal or human body.
6. The method according to claim 1 wherein the population of organisms is a population of microorganisms.
7. The method according to claim 6 wherein the population of microorganisms consists of bacteria, fungi, yeasts, viruses, protists, archaeabacteria, or eukaryotes.
8. The method according to claim 1, wherein the enzymatic activity is either an oxidoreductase, a transferase, an hydrolase, a lyase, an isomerase, a ligase, or any combination thereof.
9. The method according to claim 1, wherein the enzymatic activity is the activity of a reductase, an alcohol dehydrogenase, an alcohol oxidase, an amino acid oxidase, a monooxygenase, a dioxygenase, an amidase, an acylase, a lyase, a xylanase, a protease, a nitrilase, a nitrile hydratase, an epoxide hydrolase, a lipase or an esterase.
10. The method according to claim 1, wherein the enzymatic activity is the activity of lipase and esterase and the effect is an odor
11. The method according to claim 8, wherein the selected substrate is a derivative of 4-nitrophenyloxy-1,2-butanediol or 4-umbelliferyloxy-1,2-butanediol and can be transformed by the enzymatic activity.
12. The method according to claim 8, wherein the transformable substrate is an ester when the population of organism shares an esterase activity.

13. The method according to claim 9, wherein the ester is a 2-hydroxy-4-p-nitrophenoxy-butyl carboxylic acid ester.
14. The method according to claim 11, wherein the 2-hydroxy-4-p-nitrophenoxy-butyl carboxylic acid ester is the 2-hydroxy-4-p-nitrophenoxy-butyl hexanoate or the 2-hydroxy-4-p-nitrophenoxy-butyl decanoate.
15. The method according to claim 8, wherein the transformable substrate is the casein resorufin when the population of organism shares a protease activity.
16. The method according to claim 1, wherein the transformed substrate is directly detectable, or it is detectable after at least one additional step following the enzymatic step.
17. The method according to claim 1, wherein the amount of transformed substrate is compared with an amount of transformed substrate obtained in at least one control.
18. A method for the evaluation of the activity of a substance of interest expected to act on a population of organisms, , wherein the method according to claim 1 is performed before and after contacting said substance with the surface or liquid containing the population of organisms, and wherein the variation of the transformed substrate is measured between both situations.
19. A method for the evaluation of the activity of a substance of interest expected to act on a population of organisms, , wherein the method according to claim 1 is performed in the presence and in the absence of said

substance and wherein the variation of the transformed substrate is measured between both situations.

20. A method for the evaluation of the activity of a substance according to claims 18 and 19 wherein said substance and said sample are put together before the collecting of said sample.
21. A method for the evaluation of the activity of a substance according to claims 18 and 19 wherein said substance and sample are put together after the collecting of said sample.
22. A screening method of different substances of interest expected to act on a population of organisms, wherein the method according to claim 1 is performed with said substances and wherein the best substance is selected on the basis of the amount of transformed substrate in the presence of said best substance as compared to the other ones.
23. The method according to claims 18 to 21, wherein the substance of interest is a chemical, biological, pharmaceutical, cosmetic, veterinary or agricultural substance.
24. The method according to claim 23, wherein the substance of interest is an antimicrobial substance.
25. The method according to claim 24, wherein the substance of interest is an anti-acne composition, a deodorant or a shampoo, preferably an anti-dandruff shampoo.
26. A kit for the detection of an effect caused by a population of organisms, according to the method of claim 1, said kit comprising
  - a) a sampling tool,

- b) a substrate transformable by an enzymatic activity shared by said population of organisms,
- c) if required reagents for the detection of the transformable substrate,
- d) optionally controls.

27. A kit for the evaluation of the activity of a substance of interest expected to act on a population of organisms, cultivable or not cultivable, said kit comprising

- a) a sampling tool,
- b) a substrate transformable by an enzymatic activity shared by said population of organisms,
- c) optionally a sample control,
- d) if required reagents for the detection of the transformable substrate.

28. A kit for the evaluation of the activity of a deodorant, according to claim 26, said kit comprising

- a) sample tool,
- a) 2-hydroxy-4-p-nitrophenoxy-butyl decanoate,
- b) a control,
- c) reagents for the detection of the 2-hydroxy-4-p-nitrophenoxy-butyl decanoate.

29. The use of a method according to any of claims 1 to 17 in order to achieve the detection and/or quantification of a population of organisms,.

30. The use of a method according to any of claims 1 to 25 in order to achieve the evaluation of the activity of a substance of interest.